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A. Francis has been elected the first Wentworth professor of mathematics. He has been professor of mathematics since 1892.

THE Ohio house has passed the Cahill bill, which had previously passed the senate, providing for the compulsory teaching of agriculture in the common schools of villages and townships.

ON February 15 and 16, about one hundred and sixty members of the Illinois general assembly went to the University of Illinois to make their biennial inspection. A convocation was held in the auditorium, at which time addresses were given by various members of the house and senate. In the afternoon a conference with members of the appropriation committee and heads of the departments was held, at which time the needs of the university were presented. The university is requesting from the legislature this year for maintenance and general equipment \$2,201,000; also for new buildings, the sum of \$1,150,000; for maintenance of the College of Medicine, \$200,000. In addition to these requests it also is supporting the request of the College of Agriculture for \$1,575,750 for maintenance and equipment. In addition to the above the mining interests of the state are supporting a bill proposing an appropriation of \$240,000 for the construction of the mining engineering building and maintenance of the department of mining engineering. The ceramic interests are likewise supporting a bill proposing an appropriation of \$45,000 for the department of ceramics.

DR. JOHN G. BOWMAN, secretary of the Carnegie Foundation, has been elected president of the Iowa State University to succeed Dr. George E. MacLean.

THE Rev. Dr. George Edward Reed has resigned the presidency of Dickinson College after twenty-two years of service.

RECENT appointments in the School of Mines of the University of Pittsburgh are Dr. Charles R. Eastman, of Harvard University, as professor of paleontology; Otto Emery Jennings, of the Carnegie Museum, as instructor in paleobotany, and James Z. Zimmerman as assistant in mining. Mr. George

T. Haldeman, instructor in mining, has recently been appointed superintendent of the Mine Rescue Work of the Lehigh Valley Coal Company and Mr. Edward L. Estabrook, assistant in mineralogy, has been appointed instructor in petrology at Lehigh University.

PROFESSOR VICTOR R. GARDNER, head of the department of horticulture at the University of Maine, has accepted the appointment of associate professor of pomology at the Oregon Agricultural College, to succeed Professor C. A. Cole, who has resigned to take up industrial work.

ERNEST GALE MARTIN, Ph.B. (Hamlin), Ph.D. (Johns Hopkins), has been promoted to an assistant professorship of physiology at Harvard University.

DR. TH. PAUL, professor of chemistry at Munich, has been appointed director of the laboratory of inorganic chemistry at Leipzig, to succeed Professor Ernst Beckmann.

DISCUSSION AND CORRESPONDENCE

THE AIR WE BREATHE IN BUILDINGS

TO THE EDITOR OF SCIENCE: Two or more years ago my attention was drawn to the astonishing and unfortunate condition of the throats and tonsils of school children and the number of children who had adenoids. This led, through a series of investigations, to a general study of the air which we breathe in buildings. This air we all know is, somehow or other, not as good for us, even under the best conditions of ventilation, as the open air.

For example, children in open-air schools systematically show greater increases in the number of red blood corpuscles during the school term than during vacation. The investigations of Benedict, Atwater, Paul, Heyman, Ercklentz and Flügge, and of Dr. Leonard Hill, of the London Hospital Medical College, have given us a body of as yet undigested, although fundamentally important, information.

Dr. Gilman Thompson and Dr. Brennan, of New York City, have changed the death rates in pneumonia and certain other diseases by placing the beds of patients either out of doors

or next to open windows. These two men think that we ought to do away with all systems of ventilation and use simply natural ventilation—open windows. On the other hand, Dr. Leonard Hill writes me as follows:

I have not published in extenso my researches on ventilation and have only communicated the general drift of them to the Institution of Heating and Ventilating Engineers over here, in whose transactions my remarks appear.

The whole point of my work is to force attention to the need of cool air of average humidity. It is not the actual percentage of O_2 or CO_2 that matters, but the temperature, the humidity and the movement of the air in houses, schools, etc.

I visited yesterday a London County council school in which is installed a Plenum system with separate shaft to each school room, giving a moving air at 57–60° Fahrenheit and about 70 per cent. relative humidity. All windows and doors are kept closed. The result is admirable; lively, attentive children (at 4 P.M.) and masters looking fresh; no smell of human beings—this was only noticeable when one stood actually among the boys, not in the free spaces of the schoolroom. The headmaster has had hardly any zymotic disease, and in every respect reports better conditions than in neighboring schools with no such efficient system. The children are reported to eat more after coming to school.

We know definitely that the difference between good and bad air does not consist primarily or to any great extent in variations of oxygen or carbon dioxide, and that there is no such thing as a subtle human poison (anthropotoxin) which varies in proportion to the CO_2 .

We have tables which show the different temperatures and how air at, say, 32 degrees, with adequate relative humidity, becomes, when raised in temperature to, say 70 degrees, air practically without moisture. It appears that one of two things must have happened—either the heat must have contracted the existing moisture or the capacity of the air for moisture has been vastly increased by the rise in temperature.

Practically all of the best manuals of the heating and ventilating engineers tell us that with a good system of ventilation the opening of windows causes only danger; yet, as a mat-

ter of fact, children in rooms so treated do not, exhibit the distressing conditions referred to at the beginning of this letter.

I have already secured and digested all of the literature to which reference is made in exhaustive bibliographies, indices, and the like, on the subject of air, changes in oxygen, CO_2 , and so on, as well as the literature covering the relations of the vaso-motor system to the emotions on the one hand, and to skin circulation on the other.

I believe that the larger part of the question as to why vitality is decreased indoors can be answered through the correlation of these facts, which I already have. There are, however, certain facts which I have not, and which, so far as I have been able to find out, no one has studied. I am not a physicist, and do not know—neither do I know whether the physicists know—the reason why raising the temperature of air increases its capacity for water—in fact, its thirst for water.

I am writing to ask if any of the readers of SCIENCE know of any experiments which will throw any real light on the following questions.

Is there any difference between steam and humidity? Does steam act strictly in accordance with the ordinary laws governing the movement of gases? Does humidity in the air act exactly as steam does? I suspect that it does not, because heat causes steam to expand, whereas, when we raise the temperature of the air its capacity for moisture becomes vastly increased, which shows either that the steam has contracted or that the air has been altered in such a way as to permit of its absorbing a larger percentage of moisture than it did before.

I confess to a feeling of hesitation in presenting questions which must seem so elementary to your readers, yet when I presented to the American Society of Heating and Ventilating Engineers¹ some of the facts that we have recently discovered about the ventilation of school rooms in relation to the physical and mental condition of children they said that I

¹ *Heating and Ventilating Magazine*, February, 1911.

was upsetting the very foundations upon which heating and ventilating science was built.

It seems as if there must be somewhere in existence the knowledge which we need at the present time. Man has become in a comparatively few years a preeminently house-abiding creature. He lives in localities which are paved, where there is little opportunity for evaporation, which is a necessary condition for human living. Present conditions are not right. Does any one know in what respect our present schemes of ventilation are wrong, why delicate children and tuberculous persons get well out of doors, and fail to do so in-doors, and what we need to do to make in-door living as healthy as out-door living? If we can find the answers to these questions we shall have discovered something which will affect the vitality of all the children, and ultimately of all the adults, who live in buildings throughout the civilized world.

Any reference to original sources which any of your readers can give will be most gratefully welcomed.

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"MUTATIONS" OF WAAGEN AND "MUTATIONS"
OF DE VRIES OR "RECTIGRADATIONS" OF
OSBORN

It is important to distinguish clearly between what may be called the "mutations" of Waagen, the "mutations" of De Vries, and the rectigradations of Osborn. By careful examination of Waagen's original paper and the usage of this paper on the continent by subsequent paleontologists it appears certain that the mutations of Waagen are stages of transition between Linnæan species occurring in direct lines of phyletic ascent. These stages are distinguished by progress, although perhaps very slight in a number of different characters. The mutations of De Vries have not been distinguished in paleontology, but only in botany, and through botany extended to zoology. They represent the sudden or discontinuous jumps or saltations through which new characters arise. Definite direction is given to these characters only through selec-

tion. The "rectigradations" of Osborn are different in significance from either of the above; the term refers to the stages of single new characters occurring at definite points, hence originally termed by Osborn "definite variations." The mutations of De Vries can not be used by paleontologists, with whom the original term *saltation* would be preferable.

HENRY FAIRFIELD OSBORN

SCIENTIFIC BOOKS

Inheritance of Characteristics in Domestic Fowl. By CHARLES B. DAVENPORT. Carnegie Institution of Washington, Publication No. 121. Pp. i + 100, Pl. 1-12. 1909. Issued February 7, 1910.

This quarto volume contains a detailed account of the results of the continuation of the studies on inheritance in domestic poultry carried out by Dr. Davenport at the Station for Experimental Evolution at Cold Spring Harbor, the first instalment of the results of these investigations having appeared as Carnegie Institution Publication No. 52. A great mass of new and interesting facts are brought forth in the present work. The book is divided into twelve chapters, of which the first eleven deal severally with some of the characters which experience shows to be most difficult of definite analysis in respect to their hereditary behavior. Nearly every character discussed is one which at first acquaintance appears not at all to follow Mendelian principles (at least in their simplest form) in inheritance. Because of this fact they are of all the greater interest and significance to the student of heredity, and any systematic and thorough attempt at their analysis, such as is here made, is most heartily to be welcomed and commended, even though one may not be prepared to accept *in toto* the final interpretations reached. The extensive collection of facts brought together in this work loses none of its value if the theoretical interpretation should later be changed.

Chapter I. deals with the inheritance of the split or Y comb which appears in the progeny of a cross between a single-combed bird and one possessing a V or "horned" comb, such as